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09/998,478	11/30/2001	Scott E. Black	38190/240126	6394

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EXAMINER

PIAZZA CORCORAN, GLADYS JOSEFINA

ART UNIT	PAPER NUMBER
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1733

DATE MAILED: 08/30/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/998,478	Applicant(s) BLACK ET AL.	
	Examiner Gladys J Piazza Corcoran	Art Unit 1733	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 5/14/2004 and 5/27/2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-35 is/are pending in the application.
- 4a) Of the above claim(s) 21-35 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other. _____ |

Art Unit: 1733

DETAILED ACTION

Election/Restrictions

1. Claims 21-35 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected Groups II and III, there being no allowable generic or linking claim. Election was made **without** traverse in the Paper filed October 21, 2003.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1-3, 5, 6, 8, 9, 12, are rejected under 35 U.S.C. 102(b) as being anticipated by Lichtenwalner (Neural Network-Based Control for the Fiber Placement Composite Manufacturing Process).

Lichtenwalner discloses a method of heating a fiber tape for forming a composite article by providing a feedforward response surface (CMAC network) that defines a plurality of data points where each data point correlates a predefined velocity of the fiber tape (feed rate), a predefined feedforward control value (control voltage) and a resulting temperature of the fiber tape (page 688, 3. Control System Components), measuring the temperature of the fiber tape (temperature sensor; page 688, 3. Control System Components), determining a velocity of the fiber tape (tachometer for feed rate measurement; page 688, 3. Control System Components), determining a feedback

Art Unit: 1733

control value based on the temperature of the fiber tape (temp) and a target temperature of the fiber tape (desired temp) (page 689, 5. Inverse Model Neurocontrol Architecture and Figure 3), determining a feedforward control value (control voltage) based only on the target temperature of the fiber tape (desired temperature) and the velocity of the fiber tape (measured feed rate) and according to the feedforward response surface (CMAC network; page 689, 5. Inverse Model Neurocontrol Architecture and Figure 3), determining a heat control value (laser voltage control) based on the feedback control value and the feedforward control value and heating the fiber tape based on the heat control value (page 689, 5. Inverse Model Neurocontrol Architecture and Figure 3).

As to claim 2, the feedforward response surface comprises constructing a feedforward data table of data points (real-time plots), each data point correlating a predefined velocity of the fiber tape (feed rate), a predefined feedforward control value (control voltage), and a resulting temperature of the fiber tape (process temperature), and wherein determining a feedforward control value comprises retrieving a value from the feedforward data table (look-up table) based upon the target temperature and the velocity of the fiber tape (p. 688). As to claim 3, the constructing step is performed by operating the fiber placement machine at the predefined velocity of the fiber tape, providing the predefined feed forward control value as a heat control value, measuring the resulting temperature of the fiber tape, and storing the predefined velocity, the predefined feedforward control value and the resulting temperature as a data point in the table of data points (the look-up table is constructed by running the process in the

Art Unit: 1733

fiber placement machine). As to claim 5, a correlation between the predefined velocity, the predefined feedforward control value and the resulting temperature of the fiber tape is mathematically defined (in the look-up table and by computing the equations on page 688). As to claim 6, the feedforward control value is determined by mathematically defining the feedforward control value according to the feedforward response surface and based on the target temperature and the velocity of the fiber tape (page 689, 5. Inverse Model Neurocontrol Architecture). As to claim 8, the target temperature of the fiber tape is set (desired temperature). As to claim 9, the velocity of the fiber tape is measured (tachometer).

As to claim 12, the heat control value is determined by summing the feedback control value and the feedforward control value (page 689, 5. Inverse Model Neurocontrol Architecture and Figure 3).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was

Art Unit: 1733

not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 13-15, 17, 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lichtenwalner as applied to claims 1-3, 5, 6 above, and further in view of Krause et al. (US Patent No. 5,886,313) and/or Beyer et al. (US Patent No. 5,705,788).

Lichtenwalner discloses heating the fiber tape with a laser heater and then compacting the heated fiber tape with pressure (consolidation roller) against a workpieces such that the fiber tape conforms to the contours of the workpiece (previously laid and consolidated material) and is adhered thereto, however does not specifically recite whether the laser heater is a laser diode array. It is considered well known in the art of applying heat to strips to use a laser diode array in order to heat the material in a desired profile or cross section (i.e. width or length). For example, Krause and/or Beyer both show heating a tape material with a laser diode array. It would have been obvious to one of ordinary skill in the art at the time of the invention to heat the fiber tape as shown in Lichtenwalner by irradiating the fiber tape with a laser diode array in order to heat the fiber tape in a particular profile or cross section as is known in the art and further exemplified by Krause and/or Beyer, only the expected results would be attained.

As to claims 14, 15, 17, 18 these limitations are met by Lichtenwalner as discussed above in reference to claims 2, 3, 5, 6.

Art Unit: 1733

7. Claims 4, 5, 11, 16, 17, 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lichtenwalner (optionally in view of Krause et al. and/or Beyer et al. for claims 16 and 17) as applied to claims 1, 2, 13 and 14 above, and further in view of Konar et al. (US Patent No. 5,396,415).

Lichtenwalner discloses forming a look-up table for a neurocontroller for the feedforward control. It appears as though the look-up table is constructed empirically by operating the fiber placement machine and taking real-time plots (p.688). Konar discloses it is known in the art to use a neurocontroller by either forming a look-up table or a processor with a set of equations to calculate the appropriate values for the signals generated through either, internal weights, empirically or through modeling. It would have been obvious to one of ordinary skill in the art at the time of the invention to heat a fiber tape as shown by Lichtenwalner by constructing a table of data points through calculations (modeling equations) that calculate a resulting temperature based on a predefined velocity and feedforward control value (mathematically defining a correlation) as a known alternative to empirically forming the data table as shown by Konar.

As to claims 11 and 20, it appears as though the feedback control value in Lichtenwalner is determined using proportional control (p.689). It is considered well known in the control arts that proportional-integral-differential (PID) control is a superior control to only proportional control. Additionally, Konar discloses an example where it is known to provide a neurocontroller with a PID control. It would have been obvious to one of ordinary skill in the art at the time of the invention to heat the fiber tape as shown by Lichtenwalner by determining the feedback control value using PID control as a well

Art Unit: 1733

known superior control model compared to only proportional control and as it is known to combine a neurocontroller with PID control as exemplified by Konar, only the expected results would be attained.

8. Claims 7 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lichtenwalner (optionally in view of Krause et al. and/or Beyer et al. for claim 19) as applied to claims 6 and 18 above, and further in view of the Admitted Prior Art and/or Chang et al. (US Patent No. 6,272,664).

Lichtenwalner discloses the feedforward control value is determined mathematically by computing the value according the feedforward response surface, the target temperature and the velocity. Lichtenwalner also discloses the feedforward control function is learned automatically and that nonlinear control laws are modeled accurately. It is considered well known in the art to use a second degree control model for calculating feedforward controls. For example, the Admitted Prior Art discloses that the fitting of a surface to a set of data points may be performed by any known method for example, the least squares method and may be of any order (Specification page 11). Additionally, Chang is cited to show it is known in the art to fit data look-up tables with polynomial equations including second order equations in order to provide an accurate model of the system (column 3, lines 1-26; column 7, lines 7-10; column 10, lines 20-30). It would have been obvious to one of ordinary skill in the art at the time of the invention to heat the fiber tape as shown by Lichtenwalner by mathematically defining the feedforward control value as a second order equation as claimed as is considered

Art Unit: 1733

well known in the art and further exemplified by the Admitted Prior Art and/or Chang in order to provide a proper equation for the system.

9. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lichtenwalner as applied to claim 1 above, and further in view of Tam (US Patent No. 5,447,586).

It is unclear whether Lichtenwalner discloses using a set target velocity when determining the velocity of the fiber tape. It is considered well known in the processing arts to provide a set velocity in which the process is desired to be run and to use that velocity when measuring the actual velocity of the process. Additionally, Tam is shown as an example of where the heating of a fiber tape is controlled by setting a target velocity and using the target velocity in determining the velocity of the fiber tape. It would have been obvious to one of ordinary skill in the art at the time of the invention to heat the fiber tape as shown by Lichtenwalner by setting a target velocity and using the target velocity in determining the velocity of the tape as is considered well known in the processing arts and further exemplified by Tam in order to properly control the heating of the tape.

Response to Arguments

10. Applicant's arguments filed May 14, 2004 have been fully considered but they are not persuasive.

Applicant amended the claims to delete limitations and add the limitation of "only". Applicants arguments are directed to the previously used references Tam and Zaffiro and that these references determined the feedforward control value based on

Art Unit: 1733

more than only the target temperature, velocity and the feedforward response surface.

The newly cited reference Lichtenwalner discloses determining the feedforward control value with only the claimed variables as discussed above.

Conclusion

11. Applicant's amendment of deleting claim limitations in the independent claims and adding the claim limitation of "only" to the claims to the independent claims necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).


A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gladys J Piazza Corcoran whose telephone number is (571) 272-1214. The examiner can normally be reached on M-F 8am-5:30pm (alternate Fridays off).

Art Unit: 1733

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Blaine Copenheaver can be reached on (571) 272-1156. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


Gladys JP Corcoran
Primary Examiner
Art Unit 1733

GJPC